


L Number	Hits	Search Text	DB	Time stamp
1	105	156/230-241,247,277,289.ccls. and transferable same release	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/06/07 12:17
2	2157	427/146-149.ccls. or 428/195,914.ccls. and transferable same release	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/06/07 12:32
3	2107	(427/146-149.ccls. or 428/195,914.ccls. and transferable same release) not (156/230-241,247,277,289.ccls. and transferable same release)	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/06/07 12:32
4	1393	((427/146-149.ccls. or 428/195,914.ccls. and transferable same release) not (156/230-241,247,277,289.ccls. and transferable same release)) and heat	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM_TDB	2003/06/07 12:32
7	51	4555436.URPN.	USPAT	2003/06/07 12:32

L Number	Hits	Search Text	DB	Time stamp
1	279	lorenzo	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB USPAT	2003/06/07 10:49
4	13	("4287285"   "4923848"   "4992129"   "5277501"   "5314133"   "5489567"   "5512126"   "5785795"   "5807461"   "6095220"   "6261012"   "6296032"   "6312174").PN.		2003/06/07 10:54
7	31	("3790439"   "3922435"   "4224358"   "4235657"   "4399209"   "4548857"   "4758952"   "4966815"   "4980224"   "5019475"   "5028028"   "5059580"   "5110389"   "5139917"   "5236801"   "5252531"   "5271990"   "5334439"   "5362703"   "5407724"   "5431501"   "5707925"   "5798161"   "5861355"   "5942335"   "5981045"   "5981077"   "6054223"   "6066387"   "6071368").PN.	USPAT	2003/06/07 10:56
10	14	("3896726"   "3987725"   "4060441"   "4285747"   "4598448"   "4741922"   "5070781"   "5294279"   "5724845"   "5783024"   "5837991"   "5946961"   "6030474"   "6261012").PN.	USPAT	2003/06/07 10:57
13	0	6482285.URPN.	USPAT	2003/06/07 10:58
14	44	("3660212"   "3922435"   "4035532"   "4292100"   "4294641"   "4314813"   "4340632"   "4423106"   "4482598"   "4640727"   "4652478"   "4704310"   "4731149"   "4735854"   "4786349"   "4810549"   "4869957"   "4902364"   "4927682"   "5021275"   "5026584"   "5073423"   "5098772"   "5112423"   "5143672"   "5149388"   "5167750"   "5196080"   "5200268"   "5207851"   "5302223"   "5312645"   "5431501"   "5525403"   "5537135"   "5569347"   "5575877"   "5597641"   "5598202"   "5612140"   "5658667"   "5932352"   "6106645").PN.	USPAT	2003/06/07 10:58
17	3	("5169476"   "5785795"   "6296034").PN.	USPAT	2003/06/07 10:58
20	2	("5431501"   "6103041").PN.	USPAT	2003/06/07 10:58
23	20	("4004924"   "4123309"   "4123578"   "4157412"   "4171398"   "4275106"   "4282308"   "4536434"   "4547456"   "4704310"   "4721635"   "4775657"   "4856857"   "4910070"   "5011570"   "5182133"   "5220343"   "5261987"   "5344808"   "5501940").PN.	USPAT	2003/06/07 10:58
26	10	("4058644"   "4078886"   "4605418"   "5411931"   "5431501"   "5470818"   "5556935"   "5645888"   "5646090"   "5665676").PN.	USPAT	2003/06/07 10:59
29	2	("5673076"   "5783024").PN.	USPAT	2003/06/07 11:00
32	31	("3306867"   "4294641"   "4326005"   "4329698"   "4455147"   "4500895"   "4561789"   "4664670"   "4732815"   "4749291"   "4758952"   "4767420"   "4771295"   "4773953"   "4794409"   "4844770"   "4929969"   "4963189"   "4966815"   "4980224"   "5055444"   "5139917"   "5236801"   "5246518"   "5248363"   "5302223"   "5403358"   "5431501"   "5487614"   "5488907"   "5766398").PN.	USPAT	2003/06/07 11:00
37	13	("4684795"   "4999075"   "5000809"   "5201976"   "5275684"   "5316608"   "5437960"   "5484502"   "5486254"   "5636928"   "5637174"   "5718523"   "5806999").PN.	USPAT	2003/06/07 11:01
40	15	("3434902"   "4287285"   "4300974"   "4617080"   "4687526"   "5060981"   "5172938"   "5238524"   "5277501"   "5437960"   "5484502"   "5503702"   "5614058"   "5626699"   "5735994").PN.	USPAT	2003/06/07 11:01
45	4	("4738555"   "5326179"   "5401111"   "5486057").PN.	USPAT	2003/06/07 11:02
48	15	("3404057"   "3536571"   "4416718"   "4631110"   "5141584"   "5155003"   "5164280"   "5169476"   "5178979"   "5200297"   "5203942"   "5294514"   "5300398"   "5308739"   "5501940").PN.	USPAT	2003/06/07 11:02

55	25	("3043732"   "3376182"   "3519456"   "3554835"   "3607526"   "4027345"   "4165399"   "4171398"   "4235657"   "4318953"   "4515849"   "4555436"   "468260"   "4721635"   "4780348"   "4900597"   "4927709"   "4983436"   "4983487"   "5006502"   "5120383"   "5160778"   "5186787"   "5217793"   "5310436").PN.	USPAT	2003/06/07 11:03
66	8	("3132581"   "3785895"   "4340438"   "4465538"   "4589942"   "4869767"   "4906316"   "5019203").PN.	USPAT	2003/06/07 11:04
71	10	("4620807"   "4667208"   "4860028"   "4960338"   "5021804"   "5266969"   "5270735"   "5294203"   "5325114"   "5584589").PN.	USPAT	2003/06/07 11:04
74	23	("2528395"   "3453111"   "3918895"   "4033770"   "4064285"   "4142929"   "4167392"   "4216286"   "4224358"   "4226927"   "4234673"   "4235657"   "4284456"   "4322467"   "4407932"   "4430416"   "4555436"   "4756988"   "4773953"   "4838965"   "4863781"   "4865938"   "4880678").PN.	USPAT	2003/06/07 11:04
81	29	("2757711"   "2958367"   "3214585"   "3219794"   "3383265"   "3452181"   "3556887"   "3574031"   "3669706"   "3823317"   "3892614"   "3924533"   "3943031"   "3989367"   "4231658"   "4470858"   "4472491"   "4477299"   "4505772"   "4617080"   "4658716"   "4740816"   "4922833"   "5000809"   "5021293"   "5074019"   "5203756"   "5278023"   "5282919").PN.	USPAT	2003/06/07 11:05
88	2	("5681660").PN.	USPAT; US-PGPUB; EPO; JPO; DERWENT; IBM TDB USPAT	2003/06/07 11:07
89	7	("4857372"   "5114520"   "5192609"   "5262242"   "5370960"   "5397634"   "5484844").PN.	USPAT	2003/06/07 11:07
96	7	("4857372"   "5114520"   "5192609"   "5262242"   "5370960"   "5397634"   "5484844").PN.	USPAT	2003/06/07 11:09
99	18	5681660.URPN.	USPAT	2003/06/07 11:09
102	6	("4077830"   "4343855"   "4522881"   "4921776"   "4977136"   "5217773").PN.	USPAT	2003/06/07 11:10
103	12	5397634.URPN.	USPAT	2003/06/07 11:11
104	7	("4857372"   "5114520"   "5192609"   "5262242"   "5370960"   "5397634"   "5484844").PN.	USPAT	2003/06/07 11:12
109	9	("4007489"   "4234644"   "4569584"   "4731542"   "4897327"   "4983487"   "5102768"   "5108865"   "5217773").PN.	USPAT	2003/06/07 11:12
110	9	5370960.URPN.	USPAT	2003/06/07 11:13



## Overview - Polyester Film

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**Subcategory:** Film; Polyester, TP; Polymer; Thermoplastic

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[Proprietary Grades](#)

**Key Words:** Plastics, Polymers

The property data has been taken from proprietary materials in the MatWeb database. Each property value reported is the average of appropriate MatWeb entries and the comments report the maximum, minimum, and number of data points used to calculate value. The values are not necessarily typical of any specific grade, especially less common values and those that can be most affected by additives or processing methods.

Physical Properties	Metric	English	Comm
Density	1.25 - 1.4 g/cc	0.0452 - 0.0506 lb/in <sup>3</sup>	Ave 1.35 Grade C
Water Absorption	0.5 %	0.5 %	Grade
Moisture Absorption at Equilibrium	0.2 %	0.2 %	Grade
Water Absorption at Saturation	0.5 %	0.5 %	Grade
Moisture Vapor Transmission	0.012 - 1.2 cc-mm/m <sup>2</sup> -24hr-atm	0.0305 - 3.05 cc-mil/100 in <sup>2</sup> -24hr-atm	Ave 0.58 g-m 24h Grade C
Oxygen Transmission	0.02 - 17.9 cc-mm/m <sup>2</sup> -24hr-atm	0.0508 - 45.5 cc-mil/100 in <sup>2</sup> -24hr-atm	Average cc-m 24h Grade C
Linear Mold Shrinkage	0.0045 - 0.03 cm/cm	0.0045 - 0.03 in/in	Ave 0.017 c Grade C
Melt Flow	60 g/10 min	60 g/10 min	Grade

## Mechanical Properties

Tensile Strength, Ultimate	41 - 225 MPa	5950 - 32600 psi	Ave 180 Grade C
Film Tensile Strength at Break, TD	41 - 290 MPa	5950 - 42100 psi	Ave 240 Grade C
Film Elongation at Break, TD	60 - 445 %	60 - 445 %	Ave 83.6%; Count
Tensile Strength, Yield	35.2 - 55 MPa	5110 - 7980 psi	Ave 45.1 Grade C
Elongation at Break	30 - 440 %	30 - 440 %	Ave 120%; Count
Elongation at Yield	4 %	4 %	Grade
Tensile Modulus	2.7 - 3.79 GPa	392 - 550 ksi	Average GPa; Coun
Flexural Modulus	<u>2.8 GPa</u>	406 ksi	Grade
Secant Modulus	1.72 - 3.79 GPa	249 - 550 ksi	Average GPa; Coun
Secant Modulus, TD	1.76 - 2.025 GPa	255 - 294 ksi	Ave 1.9GPa; Cou
Charpy Impact, Unnotched	<u>22 J/cm<sup>2</sup></u>	105 ft-lb/in <sup>2</sup>	Grade
Charpy Impact, Unnotched Low Temp	<u>0.4 J/cm<sup>2</sup></u>	1.9 ft-lb/in <sup>2</sup>	Grade
Charpy Impact, Notched	<u>0.5 J/cm<sup>2</sup></u>	2.38 ft-lb/in <sup>2</sup>	Grade
Coefficient of Friction	0.2 - 0.5	0.2 - 0.5	Ave 0.39; Cou
Coefficient of Friction, Static	0.5 - 0.6	0.5 - 0.6	Ave 0.51; Co
Tensile Creep Modulus, 1 hour	<u>2400 MPa</u>	348000 psi	Grade
Tensile Creep Modulus, 1000 hours	<u>1400 MPa</u>	203000 psi	Grade
Seal Strength	102 - 3000 g/25 mm	102 - 3000 g/in	Ave 580 g/2 Grade C

## Electrical Properties

Electrical Resistivity	<u>1e+015 ohm-cm</u>	1e+015 ohm-cm	Grade
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Surface Resistance	1e+015 ohm	1e+015 ohm	Grade
Dielectric Constant	3.2	3.2	Grade
Dielectric Constant, Low Frequency	3.4	3.4	Grade
Dielectric Strength	<u>28 kV/mm</u>	711 kV/in	Grade
Dissipation Factor	0.019	0.019	Grade
Dissipation Factor, Low Frequency	0.002	0.002	Grade
Comparative Tracking Index	600 V	600 V	Co

### Thermal Properties

CTE, linear 20°C	<u>130 µm/m-°C</u>	72.2 µin/in-°F	Co
CTE, linear 20°C Transverse to Flow	<u>130 µm/m-°C</u>	72.2 µin/in-°F	Co
Melting Point	220 - 255 °C	428 - 491 °F	Ave 230°C; Cou
Maximum Service Temperature, Air	60 - 225 °C	140 - 437 °F	Ave 150°C; Count
Deflection Temperature at 0.46 MPa (66 psi)	<u>160 °C</u>	320 °F	Co
Deflection Temperature at 1.8 MPa (264 psi)	<u>60 °C</u>	140 °F	Co
Vicat Softening Point	<u>170 °C</u>	338 °F	Grade
Minimum Service Temperature, Air	<u>-40 °C</u>	-40 °F	Grade
Glass Temperature	70 - 75 °C	158 - 167 °F	Ave 72.5°C; Cou
Flammability, UL94	HB	HB	Grade
Oxygen Index	24 %	24 %	Grade

### Optical Properties

Haze	0.2 - 12 %	0.2 - 12 %	Ave 6%; Coun
Gloss	105 - 200 %	105 - 200 %	Ave 170%; Coun
Transmission, Visible	70 - 90 %	70 - 90 %	Ave 79%; Coun

### Processing Properties

Processing Temperature	154 - 275 °C	309 - 527 °F	Ave 190°C;
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Nozzle Temperature

280 °C

536 °F

Coun

Grade

Drying Temperature

130 - 170 °C

266 - 338 °F

Ave  
150°C;  
Cou

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## Atohaas Americas Plexiglas® V052 General Purpose Acrylic Resin

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**Subcategory:** Acrylic; Polymer; Thermoplastic

**Close Analogs:** Data provided by the manufacturer.

**Key Words:** Poly(methyl methacrylate); PMMA; Polymethylmethacrylate

**Material Notes:**

For injection molding. Superior mold release.

No vendors are listed for this material. Please [click here](#) if you are a supplier and would like information on how to add your lis to this material.

Physical Properties	Metric	English	Comm
Density	1.19 g/cc	0.043 lb/in <sup>3</sup>	ASTM
Water Absorption	0.3 %	0.3 %	24 hr immersion; ASTM
Linear Mold Shrinkage	0.002 - 0.006 cm/cm	0.002 - 0.006 in/in	cold mold to cold piece - 48 hrs;
Melt Flow	2.8 g/10 min	2.8 g/10 min	Condition I; ASTM D
<b>Mechanical Properties</b>			
Hardness, Rockwell M	96	96	ASTM
Tensile Strength, Ultimate	70.3 MPa	10200 psi	ASTM
Flexural Modulus	3.1 GPa	450 ksi	
Flexural Yield Strength	Max 103 MPa	Max 14900 psi	ASTM
Izod Impact, Notched	0.12 J/cm	0.225 ft-lb/in	ASTM
Gardner Impact	1.4 J	1.03 ft-lb	J; Falling Dart 15 cm x 15 cm x 0.3 c kg dart; 6.4 mm
<b>Thermal Properties</b>			
Melting Point	130 °C	266 °F	
Maximum Service Temperature, Air	74 - 88 °C	165 - 190 °F	
Deflection Temperature at 1.8 MPa (264 psi)	93 °C	199 °F	Annealed; ASTM
Vicat Softening Point	103 °C	217 °F	Unannealed, 50°C/hr, 1 kg; ASTM D
Glass Temperature	105 °C	221 °F	ASTM D
<b>Optical Properties</b>			

Refractive Index	1.49	1.49	ASTM
Haze	Max 2 %	Max 2 %	ASTM D
Transmission, Visible	92 %	92 %	Total White Light; ASTM D

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## Overview - Polyester Thermoplastic Elastomer

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**Subcategory:** Elastomer, TPE; Polyester, TP; Polymer; Thermoplastic

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**Keywords:** TPE; Plastics, Polymers

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Physical Properties	Metric	English	Comments
Density	1.07 - 1.43 g/cc	0.0387 - 0.0517 lb/in <sup>3</sup>	Average = 1.2 g/cc; Comments
Water Absorption	0.08 - 5 %	0.08 - 5 %	Average = 0.976%; Comments
Moisture Absorption at Equilibrium	0.4 %	0.4 %	Grade Comments
Water Absorption at Saturation	7 %	7 %	Grade Comments
Linear Mold Shrinkage	0.01 - 0.02 cm/cm	0.01 - 0.02 in/in	Average = 0.015 cm/cm; Grade Comments
Melt Flow	1.8 - 23 g/10 min	1.8 - 23 g/10 min	Average = 10.2 g/10 min; Grade Comments

### Mechanical Properties

Hardness, Shore D	30 - 82	30 - 82	Average = 50; Grade Comments
Tensile Strength, Ultimate	10.2 - 55 MPa	1480 - 7980 psi	Average = 30.1 MPa; Comments
Tensile Strength, Yield	2.1 - 30.3 MPa	305 - 4390 psi	Average = 8.6 MPa; Comments
Elongation at Break	200 - 850 %	200 - 850 %	Average = 480%; Grade Comments
Tensile Modulus	0.092 - 2.4 GPa	13.3 - 348 ksi	Average = 0.74 GPa;

			Cou
Flexural Modulus	0.0248 - 2.41 GPa	3.6 - 350 ksi	Average = 0.28 GPa; Coun
Flexural Yield Strength	48 - 83 MPa	6960 - 12000 psi	Average = 65.5 MPa; Cou
Compressive Yield Strength	<u>21 MPa</u>	3050 psi	Grade Co
Izod Impact, Notched	0.4 - NB	0.749 - NB	Average = 13.2 J/c computed as 15 J/cm); Coun
Izod Impact, Unnotched	NB	NB	Grade Cou
Izod Impact, Notched Low Temp	0.2 - NB	0.375 - NB	Average = 3.6 J/c computed as 7.5 J/cm); Coun
Taber Abrasion, mg/1000 Cycles	3 - 15	3 - 15	Average = 6.6 mg Cycles; Grade Cou

### Electrical Properties

Electrical Resistivity	1e+010 - 1e+016 ohm-cm	1e+010 - 1e+016 ohm-cm	Average = 3E+15 oh Grade Cou
Surface Resistance	1e+013 ohm	1e+013 ohm	Grade Cou
Dielectric Constant	4.6 - 4.9	4.6 - 4.9	Average = 4.8; Grade C
Dielectric Constant, Low Frequency	5.3	5.3	Grade Cou
Dielectric Strength	<u>19.7 kV/mm</u>	500 kV/in	Grade Cou
Dissipation Factor	0.035 - 0.04	0.035 - 0.04	Average = 0.038; Grade
Dissipation Factor, Low Frequency	0.025	0.025	Grade Cou
Arc Resistance	<u>40 sec</u>	40 sec	Grade Co

### Thermal Properties

CTE, linear 20°C	81 - 221 µm/m-°C	45 - 123 µin/in-°F	Average = 170 µm Grade Co
Thermal Conductivity	<u>0.14 W/m-K</u>	0.972 BTU-in/hr-ft²-°F	Grade Cou
Melting Point	150 - 223 °C	302 - 433 °F	Average = 190°C; Coun
Maximum Service Temperature, Air	38 - 148 °C	100 - 298 °F	Average = 65.6°C; Coun
Deflection Temperature at 0.46 MPa (66 psi)	42 - 157 °C	108 - 315 °F	Average = 84.2°C; Cou
Deflection Temperature at 1.8 MPa (264 psi)	38 - 67 °C	100 - 153 °F	Average = 47.7°C; Cou
Vicat Softening Point	76 - 212 °C	169 - 414 °F	Average = 150°C; Coun
Minimum Service Temperature, Air	-70 - -65 °C	-94 - -85 °F	Average = -69.4°C; Cou
Brittleness Temperature	-70 - -65 °C	-94 - -85 °F	Average = -69.4°C; Co
Flammability, UL94	HB	HB	Grade Coun

### Processing Properties

Processing Temperature	190 - 241 °C	374 - 466 °F	Average = 200°C; Coun
Mold Temperature	<u>52 °C</u>	126 °F	Grade Cou
Processing Temperature	<u>100 °C</u>	212	Grade C u



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